# Data Driven Quality Management: The Value of Achieving Quality Maturity



Quality leaders in manufacturing companies today are facing new challenges and opportunities presented by changing global markets, disruptive technologies, new regulations, and social media. Unfortunately, quality management maturity has plateaued, preventing quality management from effectively addressing these challenges.

Quality management is stuck in a catch-22. The investments that market leading organizations have made in quality allow them to more clearly see the benefits of quality, leading to continued investments. Conversely, companies with siloed and fragmented quality—the majority of industry—cannot generate the internal metrics and proof of value, reducing and slowing investment. Leaders in these organizations need strategies, tools and data to establish the value of quality to the organization.

This is an important problem to solve. According to the LNS Quality Management survey, 87% of Quality leaders identify that their inability to improve operational excellence—people, process, and technology best practices—is a top challenge in meeting market trends. LNS Research has quantitatively shown that this inability to improve Operational Excellence is directly connected with a lack of top executive sponsorship. Long-term executive sponsorship means top-down support, executive voice, and sustained resources, which are the three elements that quality needs to thrive. Most quality leaders have not been able to garner this level of executive support.

While value engineering activities can result in a calculated ROI of a specific best practice using a narrowly targeted metric, these activities cannot credibly use broadly applicable operational or financial metrics. For instance, while value engineering can believably predict that adopting a corporate-wide corrective action process might reduce non-conformances, these activities are insufficient to connect corrective action improvements to On Time Delivery (OTD), Overall Equipment Effectiveness (OEE), or Cost of Poor Quality (CoPQ). Unfortunately, there has also been little published data that quantifies the benefits of improving quality management maturity or the measurable impact of adopting specific best practices on these broader metrics.

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Quality leaders across industry need guidance to gain executive sponsorship by clearly communicating the value of both quality management and specific quality management best practices in a manner that will resonate with executive sponsors and cross-functional leaders. This Research Spotlight will discuss:

- A quality maturity definition, why quality maturity is important to quality leaders, and how top executive sponsorship for quality management impacts quality maturity

- Strategies to improve quality maturity across people, processes, and technology

- The measurable impact of improving quality maturity on quality, operational, and financial metrics

- The measurable impact of specific selected quality management best practices on quality, operational, and financial metrics

- How to create a business case journey that progressively improves quality maturity, nurtures executive sponsors, and improves corporate performance

While quality leaders are faced with many challenges and priorities, LNS Research has identified that executive sponsorship is the single most important element to quality management maturity. The data in this report helps to address the lack of published benefits driven from quality maturity and specific quality best practices. LNS Research encourages companies to use the data contained in this report to build executive business cases and improve quality maturity.
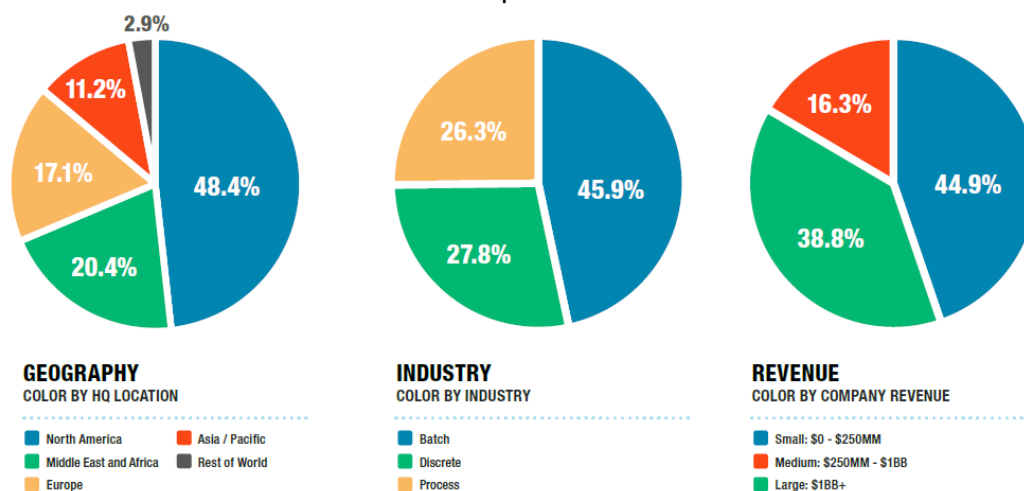
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# Demographics

It is important to set the stage for the supporting data used throughout this Research Spotlight. The LNS Research Quality Management Survey has been completed by over 700 executives and other senior leaders coming from a variety of company sizes and geographies across a range of industries. The survey questions drill down into the challenges and opportunities that companies face, strategic objectives data, and the most important goals currently being pursued around quality.

There were 45.9% of companies from batch manufacturing industries, with the remainder coming from discrete, and process manufacturing. Nearly half were from North America, followed by just under a quarter from the Middle East and Africa. Almost half, 44.9%, were from small companies, with 38.8% from large companies, and the remainder from mid-sized companies.



**GEOGRAPHY**
COLOR BY HQ LOCATION

- North America
- Middle East and Africa
- Europe
- Asia / Pacific
- Rest of World

**INDUSTRY**
COLOR BY INDUSTRY

- Batch
- Discrete
- Process

**REVENUE**
COLOR BY COMPANY REVENUE

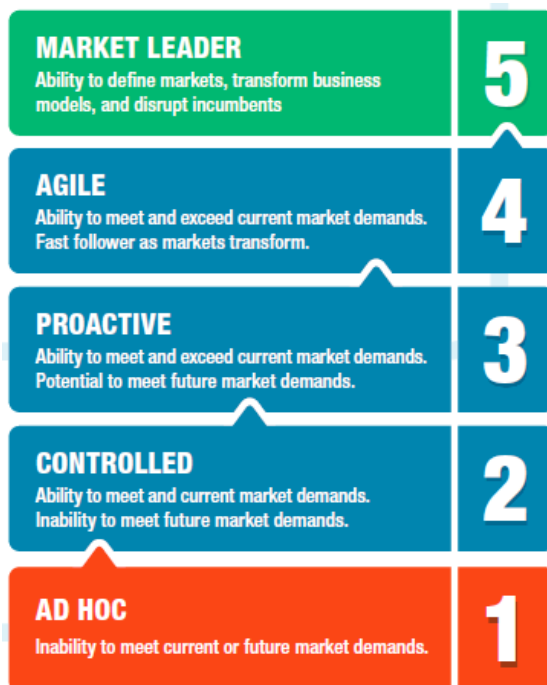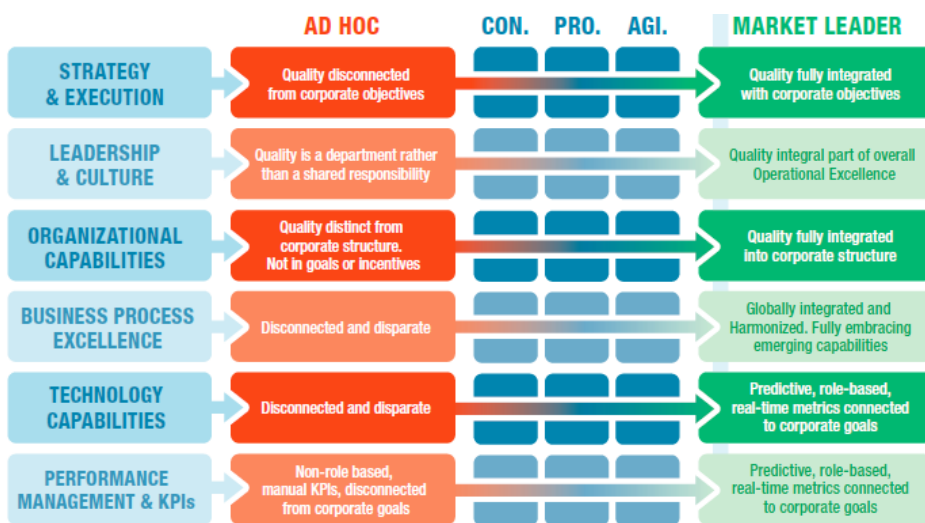- Small: $0 - $250MM
- Medium: $250MM - $1BB
- Large: $1BB+

# Journey to Quality Maturity

## What Is Quality Maturity?

LNS Research has long held the stance that the correct way to view quality management is through the lens of Operational Excellence: an organization's adoption of people, process, and technology best practices. While these are described in detail in other LNS Research publications, it is important to realize that all three of these elements interconnect, and that any change to one element will also impact the other two. Therefore, in order to maximize the impact of quality investment, quality leaders must optimize across these three elements.



**MARKET LEADER** — Ability to define markets, transform business models, and disrupt incumbents **5**

**AGILE** — Ability to meet and exceed current market demands. Fast follower as markets transform. **4**

**PROACTIVE** — Ability to meet and exceed current market demands. Potential to meet future market demands. **3**

**CONTROLLED** — Ability to meet and current market demands. Inability to meet future market demands. **2**

**AD HOC** — Inability to meet current or future market demands. **1**

LNS Research's Quality Maturity Model provides a perspective that connects Operational Excellence with the ability to meet market demands. Organizations can use the maturity levels both as a yardstick to measure their current maturity, as well as a method for guiding future investments. Comparing the performance at Level 1 (Ad Hoc) versus Level 5 (Market Leader) provides clear impact of quality maturity.



| | AD HOC | CON. | PRO. | AGI. | MARKET LEADER |
|---|---|---|---|---|---|
| STRATEGY & EXECUTION | Quality disconnected from corporate objectives | | | | Quality fully integrated with corporate objectives |
| LEADERSHIP & CULTURE | Quality is a department rather than a shared responsibility | | | | Quality integral part of overall Operational Excellence |
| ORGANIZATIONAL CAPABILITIES | Quality distinct from corporate structure. Not in goals or incentives | | | | Quality fully integrated into corporate structure |
| BUSINESS PROCESS EXCELLENCE | Disconnected and disparate | | | | Globally integrated and Harmonized. Fully embracing emerging capabilities |
| TECHNOLOGY CAPABILITIES | Disconnected and disparate | | | | Predictive, role-based, real-time metrics connected to corporate goals |
| PERFORMANCE MANAGEMENT & KPIs | Non-role based, manual KPIs, disconnected from corporate goals | | | | Predictive, role-based, real-time metrics connected to corporate goals |

## Quality and Strategic Objectives

Quality leaders must think outside departmental goals and communicate impact in terms that resonate with the audience—leaders from other functions and top executives. Those looking to achieve Market Leader quality maturity must attain top executive sponsorship in order to shift the culture from "quality is a department" to "quality is a cross-functional responsibility." This shift can begin with a movement in quality's objectives.

While quality must ensure that companies efficiently meet quality compliance and conformance requirements, other functions and top executives do not often have KPIs or objectives tied to compliance and conformance. In level 1 companies, for example, data may be siloed in paper-based systems or disconnected spreadsheets. Only after maturing into a data-driven environment with a single source of available data can they utilize best practices with before and after measurement of KPIs.  Quality leaders must discover the KPIs and objectives of cross-functional leaders and top executives, determine how quality can help accomplish these objectives, then communicate the alignment of quality with these objective using the appropriate metrics.

Quality leaders should determine if other leaders and top executives have objectives to improve customer service, OTD, and/or manufacturing performance. Is there an Internet of Things (IoT) initiative under way? Expressing the impact of quality in terms that resonate with the target audience leads to joint planning, sponsorship, and extension of quality more broadly across the organization. As a result, the people, process, and technology practices of quality will be improved such that all related functions can work together more effectively to accomplish objectives.

## Operational Excellence Strategies to Improve Quality Maturity

LNS Research has analyzed best practices across people, processes, and technology and determined that the following strategies have the most significant impact on quality management maturity.

**People:** As stated earlier, the single most important factor in quality management maturity is attaining top executive sponsorship. LNS analyzed adoption of 28 best practices and found that those that identified that quality is a top executive priority adopted an average of 2.9 times as many best practices than those that did not. This has a significant impact on a company's standing versus its peers; when analyzing the adoption of quality management best practices across industry, those with top executive sponsorship averaged in the second highest quintile of

best practice adoption, where those without executive sponsorship averaged in the second lowest quintile. Top executives force cross-functional engagement, which drives Operational Excellence improvements.



**Adoption of Quality Management Best Practices**
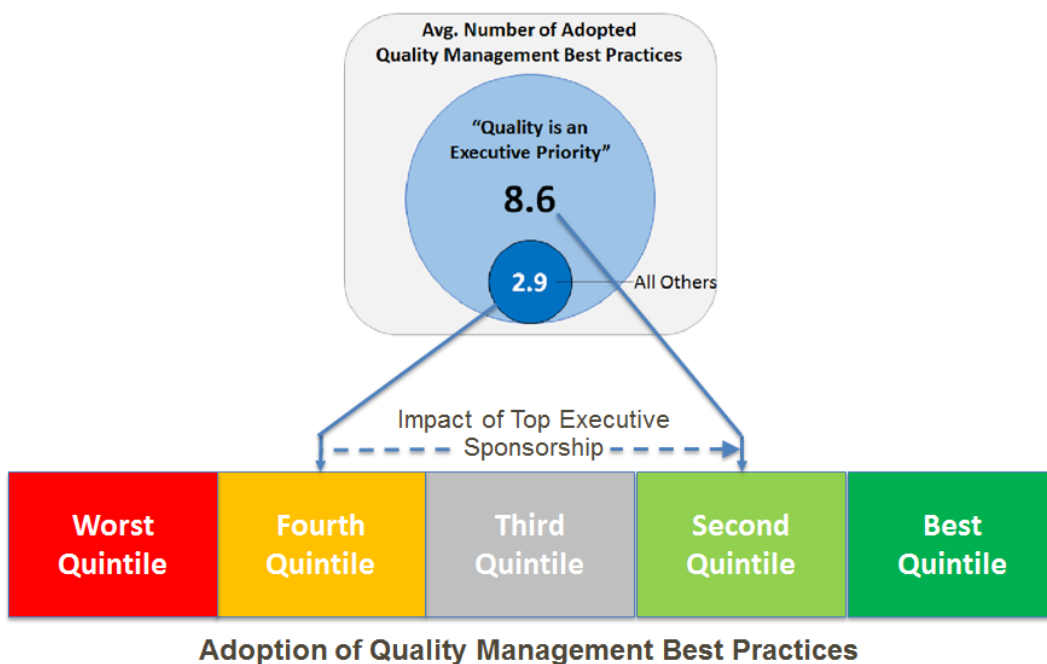
**Process:** Organizations should emphasize deployment of cross-functional processes. In ensuing sections of this report, there are many specific examples that quantify the impact of cross-functional best practices. However, analysis across all best practices identifies that paper-based standalone processes provide demonstrably lower performance than cross-functional practices.

**Technology:** Leaders should leverage appropriate technology to enable cross-functional processes and enterprise visibility. Emphasis should be placed on technology that enables cross-functional collaboration with internal and external stakeholders, technology that automates/manages processes, and technology that provides real-time metrics.

## Metrics: The Language of Improvement

Metrics are the language used to express expected benefits, and care should be taken to ensure that they convey the value in terms that will credibly resonate with the audience. Choice in metrics can express the expected value of an improvement. For instance, selecting metrics that measure the success of an individual department can communicate that the activity is of primary interest to that department, and may not have broader applicability to other functions, or the corporate at large.

Additionally, the metrics chosen can drive unexpected consequences. As an example, justifying an investment based on greater departmental efficiency may require elimination of departmental manpower, which is likely not the desired outcome. Expressing the same investment in terms of improved OTD, OEE, and so on shows a positive and likely cross-functional impact, and does not require elimination of positions. LNS has defined five classes of justification metrics shown below arranged in order of ascending strategic importance.



**BIG DATA**
Leverages real-time data to perform Descriptive, Diagnostic, Predictive, and Prescriptive analytics

**VALUE**
Metrics that capture positive Value, such as market share, revenue, earnings, revenue/earnings growth, and % successful NPI

**FINANCIAL**
Metrics that capture financial costs, such as Cost of Poor/Good Quality, Cost of Compliance/Noncompliance

**OPERATIONAL**
Metrics that capture the performance of operations, such as OEE, TTM, OTD

**SILOED**
Departmental metrics such as # Records, personnel efficiency, # IT systems, adoption

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# Advance Strategic Goals Through Mature Quality Operational Excellence

Quality leaders need to select the appropriate people, process, and technology best practices that will drive value, improve Operational Excellence maturity, and connect quality across functions. They must also need to demonstrate the value of these best practices in a credible fashion.

The following sections provide the benefits associated with selected best practices. The best practices are organized by metric and objective type, along with data generated by LNS Research to quantify the average improvement in performance achieved by companies that have deployed these best practices.

## Siloed Metrics and Departmental Scope

Organizations that are at Level 1 or 2 Quality Maturity often use siloed metrics and most often develop business cases of a departmental scope. Quality leaders at Level 1 and Level 2 are often still optimizing quality department-specific best practices. At this stage of maturity, LNS recommends identifying best practices that are easier for quality teams to deploy without large amounts of cross-functional engagement. Demonstrating success with these best practices will position quality leaders for later cross-functional success.

LNS Research tracks a number of siloed metrics and best practices that do not require extensive cross-functional engagement. These are broken out by objective below. All metrics compare average performance of those that have adopted a specific best practice to the average performance of those that have not.

### Objective: Reduce Customer Complaints

**Process Best Practice:**

- Reduce complaints by an average of 78% by adopting a standardized escalation process for supplier quality and non-compliance events

**Technology Best Practices:**

- Reduce complaints by an average of 29% by automating Complaint Handling with software

- Reduce complaints by an average of 69% by providing real-time visibility to quality metrics in manufacturing

**Objective: Increase First Pass Yield (FPY) / Reduce Scrap and Rework**

**Technology Best Practices**

- Increase FPY by an average of 5% by automating Hazard Analysis & Critical Control Points (HACCP) with software

- Increase FPY by an average 4% by automating Risk Management with software

- Increase FPY by an average of 3% by deploying Enterprise Quality Management Software (EQMS)

**Objective: Reduce Supplier Defect Rate (SDR) / Improve Supplier Quality**

**Process Best Practice:**

- Reduce SDR by an average of 46% by standardizing the escalation process for supplier quality and non-compliance events

**Technology Best Practices:**

- Reduce SDR an average of 45% by collecting supplier quality data automatically through a Web-based portal

- Reduce SDR by an average of 19% by providing real-time visibility of quality metrics in supplier performance

## Operational Metrics and Cross-Functional Scope

Organizations that are at Level 3 leverage operational metrics and most often develop business cases of a cross-functional scope. Quality leaders this level should deploy cross-functional best practices. At this stage, LNS recommends increasing focus on cross-functional engagement to continue to expand out of the silo and gain cross-functional traction.

**Objective: Increase OEE**

**Process Best Practice:**

- Increase OEE by an average of 3% by including suppliers in Design for Quality initiatives

**Technology Best Practices:**

- Increase OEE by an average of 10% by automating Supplier Quality Management with software

- Increase OEE by an average of 9% by automating Audit Management with software

- Increase OEE by an average of 8% by automating Production Part Approval Process (PPAP) with software

- Increase OEE by an average of 7% by automating Advanced Product Quality Plan with software

## Objective: Improve OTD

**Process Best Practices:**

- Improve OTD by an average of 8% by adopting formal, company-wide NC/CAPA process

- Improve OTD by an average of 8% by adopting closed-loop processes to connect quality across design, manufacturing, and suppliers

**Technology Best Practices**

- Improve OTD by an average of 8% by enabling visualization of risk factors across operations

- Improve OTD by an average of 7% by automating and integrating Environmental, Health, and Safety (EHS) systems with EQMS

- Improve OTD by an average of 7% by automating PPAP with software

## *Financial Metrics and Cross-Functional Scope*

As quality organizations continue on the business case journey, one common goal is to drive business cases based on the Total Cost of Quality (TCoQ). One commonly accepted definition of TCoQ comes from the American Society of Quality. In this definition, TCoQ = Cost of Poor Quality (CoPQ) + Cost of Good Quality (CoGQ), where CoPQ = CoPQ-Internal + CoPQ-External, and CoGQ = CoGQ-Appraisal + CoGQ-Prevention.

This definition is widely used, and LNS Research uses it to survey TCoQ from the field. However, relatively few respondents have the ability to effectively and accurately generate TCoQ data. This is partially due to quality maturity – low maturity organizations lack data-driven systems to collect TCoQ data - but also because of the challenges that organizations have in practically applying the definitions of CoPQ and CoGQ. For instance, in a quality test lab, dividing the labor and capital equipment costs between CoPQ and CoGQ can be difficult and time consuming when one considers that the quality lab may be used for CoGQ-Prevention as well as for CoPQ-Internal and CoPQ-External costs.

Quality leaders should consider how TCoQ will be defined, measured, and reported. LNS Research suggests defining TCoQ in such a way that it can be effectively used as a management metric. One possible definition follows:

***Total Cost of Quality (TCoQ) = Planned Cost of Quality + Unplanned Cost of Quality***

**Planned Cost of Quality:** This is the "quality budget," and like any budget, it includes planned capital expenditures as well as operational expenditures, and is reviewed annually. The budget should include the quality department personnel as well as equipment used by quality, without having to separate these by their intended use. This should not include quality costs incurred by other functions in performance of quality activities, as this will increase effort to deploy and manage. Recall that quality should be a responsibility, not a department.

**Unplanned Cost of Quality:** This is everything outside of the established quality budget. This includes costs incurred to address quality failures and events, as well as unplanned investment in new resources. Examples include costs associated with scrap, rework, corrective actions, and recalls. Of course, these costs can be projected, but they should not be included in the Planned Cost of Quality because they are not planned. This is where a company should consider the labor costs that came from unplanned cross-functional engagement. Other departments could effectively send a "bill" to quality for these unplanned activities. In order to aid reporting and Operational Excellence decision making, the next tier of the cost breakdown structure could follow the corporate Operational Architecture.

## *Value Metrics and Executive Scope*

A prevailing opinion in industry is that the most strategic metric for quality is Cost of Quality. Indeed, this surely is a strategic metric as it impacts the bottom line; however, quality has a top line impact as well, which has increasingly come into focus. Many companies, from small to multi-nationals across industry, are increasing emphasis on quality as a means to generate progress against top line objectives.

Leaders should target Value of Quality as the ultimate method to express the projected impact of quality management, as it most closely connects quality with corporate success. The Value of Quality is expressed in terms of the impact of quality management to corporate top line, using metrics such revenue growth, penetration into new markets, market share, and so on. Percentage successful New Product Introductions (NPI) is a metric that closely aligns with the Value of Quality, as successful new products are closely aligned with revenue growth and market share.

## *The Business Case Journey*

The elements of quality management maturity, objectives scope, business case scope, and metrics are inter-related. Companies that are low maturity have difficulty progressing to higher levels of maturity because of challenges communicating value and securing executive sponsorship. However, by recognizing the relationship between these concepts, and by building a plan to increase maturity, quality leaders can gain executive sponsorship, nurture executive sponsorship through increasingly impactful best practice deployments, and arrive at a much higher maturity.

The business case journey graphic is a tool that supports development of this plan. Leaders can use it to map a course from the initial as-is state to the ultimate to-be state through a number of progressively more mature steps.
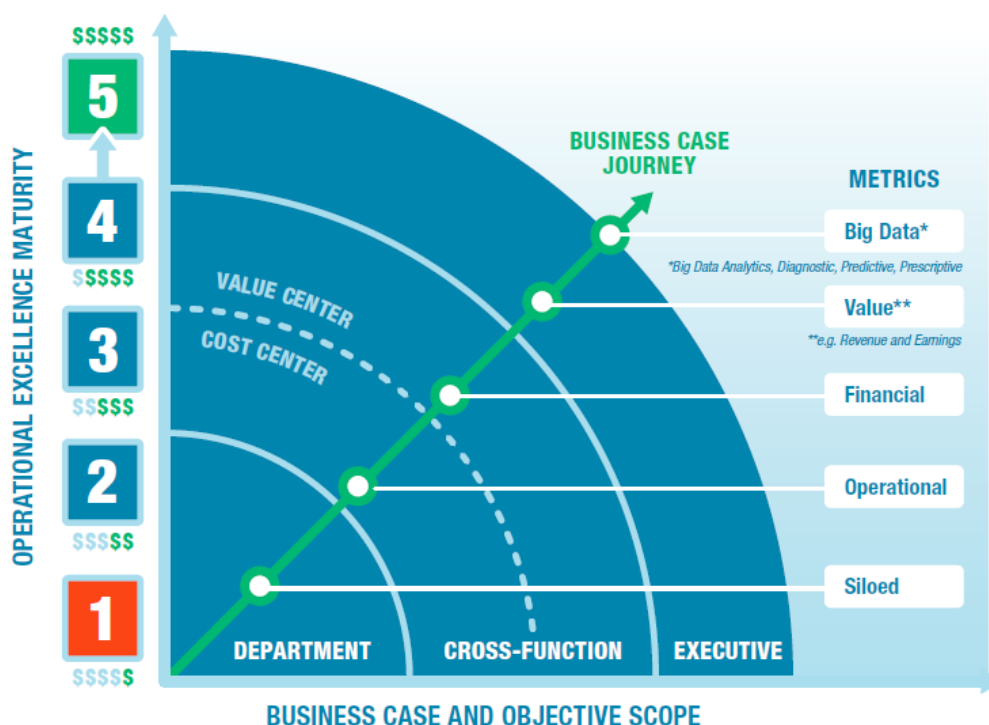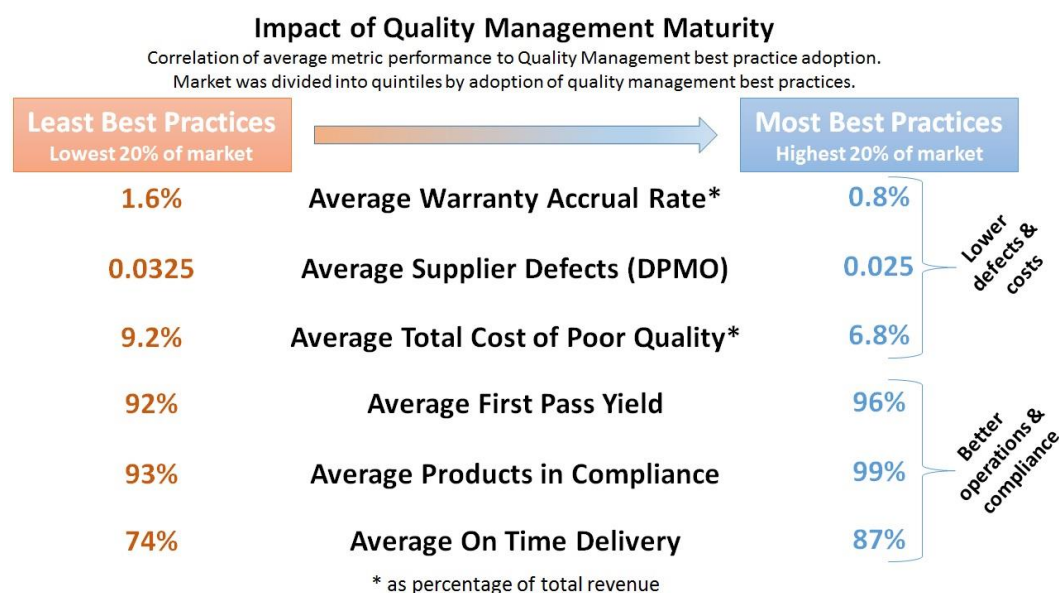


However, leaders may need assistance identifying the value of adopting quality best practices. What is the value of quality maturity? To answer this question, LNS Research captured the adoption of quality best practices across industries (N=1,199), as well as the performance of these companies across several common metrics. The companies were divided into quintiles according to their adoption of best practices, where the first quintile included the 20% that had adopted the most quality best practices and the fifth quintile included the 20% that had adopted the fewest best practices.

It is clear that increased quality best practice adoption results in increased performance. Note that "Total Cost of Poor Quality" is a sum of Cost of Poor Quality-Internal and Cost of Poor Quality-External, and is expressed as a percentage of revenue.

### Impact of Quality Management Maturity

Correlation of average metric performance to Quality Management best practice adoption.
Market was divided into quintiles by adoption of quality management best practices.

| Least Best Practices<br>Lowest 20% of market | | Most Best Practices<br>Highest 20% of market | |
|---|---|---|---|
| 1.6% | Average Warranty Accrual Rate* | 0.8% | Lower defects & costs |
| 0.0325 | Average Supplier Defects (DPMO) | 0.025 | |
| 9.2% | Average Total Cost of Poor Quality* | 6.8% | |
| 92% | Average First Pass Yield | 96% | Better operations & compliance |
| 93% | Average Products in Compliance | 99% | |
| 74% | Average On Time Delivery | 87% | |

* as percentage of total revenue

## Recommendations and Actionable Next Steps

Quality leaders looking to differentiate their companies must look beyond process definition and training, and increase their maturity across all three legs of Operational Excellence: people, processes, and technology. LNS Research data shows that companies which have increased their quality maturity by adopting quality management Operational Excellence best practices have improved departmental, operational, and financial performance. LNS Research data also quantitatively identifies the impact of specific best practice adoption on metrics and objectives.

LNS Research recommends that organizations:

- Align quality with strategic objectives in order to create increased relevance across functions and with top executives
- Deploy people, process, and technology strategies that drive increased maturity. Specifically:
  - Plan, gain, and nurture executive sponsorship, as those organizations where quality is a top executive priority have roughly triple the number of quality best practices deployed

- o Focus on deploying cross-functional processes, being sure to use opportunities to gain alignment and support from cross-functional stakeholders
- o Leverage technology that supports cross-functional processes and creates enterprise-wide participation in quality processes and with quality data
- Leverage the appropriate metrics to ensure that the language of improvement is meaningful to the audience
- Identify best practices that provide quantifiable progress towards important objectives, as measured by appropriate metrics
- Use the quality business case journey to plot a course from the initial as is state to an ultimate to be state
- Plan, gain, and nurture executive sponsorship using the executive business case. This executive business case should internally message the value of quality management through a master business case